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Contourable Inflatable Orthopedic Pillow

CLAIM FOR PRIORITY

Applicant claims priority to U.S. Provisional Patent Application No. 60/199,587 filed on April 25, 2000 and to U.S. Provisional Patent Application No. 60/216,021 filed on July 3, 2000.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of cushions of all types, particularly but not limited to cushions for beds, such as head pillows and mattresses, and furniture, including the main cushions for sitting and lying as well as the loose cushions and pillows associated with some types of furniture. Those skilled in the art will recognize the myriad of applications for the cushions of the invention.

2. Background Art

There is considerable prior art in the field of ergonomic, orthopedic or contoured pillows and cushions. The objective of the prior art devices is to support the head and neck during sleep in a position that is similar to the position of the head and neck in a standing or sitting person during waking hours. To that end, the pillows are thicker in the portion that underlies the neck and thinner in the portion that underlies the head. Most of the prior art orthopedic cushions have three general sections: (1) a shallow center portion for the head to rest upon; (2) a bulbous edge portion thicker than the center portion for the neck to rest upon while lying on one's back; and (3) opposite from this bulbous edge portion, an even thicker bulbous secondary edge portion for the neck to rest upon while lying on one's side.

There are also numerous prior art orthopedic cushions that contain inflatable bladders. These bladders are to adjust the firmness of one or more of the three above-described sections of the pillow, and to a very limited extent, the contour. Examples of such cushions include U.S. Patent Nos. 4,501,034; 4,528,705; 4,829,614; 4,979,249; and 5,068,933, each of which is hereby incorporated by reference. These pillows are all meant to be a very specific shape to accomplish the designs of the inventor. None of them are of such a shape that they can be turned over and used on the other side.

Unfortunately, orthopedic pillows are still in only limited use. Their cost is generally higher than for non-orthopedic pillows, especially those orthopedic pillows containing inflatable bladders. The bladder configurations of prior art pillows are all complex in nature, significantly adding to the cost. A major reason for rejecting prior art orthopedic pillows is the radical departure from traditional (flat) pillow shapes, to which the user has a difficult time adjusting.

None of the highly-shaped orthopedic pillows of the prior art address the need for a pillow that is adjustable in shape in the range from flat to fully contoured. There exists a need for such a pillow, so that the user can gradually adjust the pillow over the course of many nights to have more and more contour, until he or she is used to the full orthopedic shape and can thus reap the full benefits.

There also exists a need for such a pillow for those that can never get used to the full orthopedic shape, but can still reap the partial benefit from a shape that is somewhere between flat and fully contoured. There exists a need for such a pillow in situations where the pillow is used by different

people on different nights, such as in a person's guest room or in a hotel, so that each person can adjust the pillow to his or her preference, including completely flat.

There exists a need for such a pillow because every person's body is different, and sleep positions differ, and a pillow that is completely adjustable as to the degree of orthopedic bulbousness will accommodate more people than the many prior art pillows whose shape is set by the pillow design. There also exists a need for an adjustable orthopedic pillow that is less complex and is inexpensive relative to prior-art bladder-type orthopedic pillows. There also exists a need for an orthopedic pillow that can be flipped over and used on either side.

SUMMARY OF THE INVENTIONS

The pillows of the invention in their various embodiments address these needs. In its non-inflated form, one embodiment of the invention is completely flat like a standard foam pillow. It uses an exceptionally simple, single chamber flat-welded bladder that is very inexpensive to produce and install. It can be adjusted by inflation to any degree of bulbousness from completely flat to fully orthopedic, thus allowing the user to either set it permanently at the desired degree or to gradually increase the bulbousness as he or she gets used to having an orthopedic pillow. It allows different users to set the degree of bulbousness to their own preference or their own body's needs. The construction is simple and takes little labor, and the materials are inexpensive, thus allowing the pillow to be made at low relative cost. This orthopedic pillow of the invention can be flipped over and used on either side.

In other embodiments of the orthopedic pillows of the invention, other features are added which add additional desired properties. Persons of ordinary skill in the art will comprehend the objects, features and advantages of the inventions on reading the text of the patent in conjunction with the appended drawings..

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A depicts an embodiment of the invented pillow without air in its interior.

Figures 1B and 1C depict the air bladder pillow of Figure 1A partially filled with air.

Figure 1D depicts the air bladder pillow of Figure 1A fully inflated with air.

Figures 2A-2H depict another embodiment of the invention from uninflated to fully inflated.

Figures 3A-3C depict embodiments of the invention with an outer cushioning layer on a pillow substrate.

Figures 4A-4D depict embodiments of the invention intended to be filled with a soft filler material other than a gas.

Figure 5 depicts another bladder of the invention.

DETAILED DESCRIPTION OF SOME PREFERRED EMBODIMENTS

Referring to Figures 1A-1D, one embodiment of the invention is depicted.

Figure 1A shows the pillow 100 in its flat configuration prior to inflation. Users that wish to gradually become accustomed to an orthopedic pillow would start in this flat configuration until they are used to the particular foams

used in the pillow. To construct this pillow, a piece of resilient material 1 has a flat-welded plastic air bladder 3 placed on the resilient material's top surface. For purposes of discussion, we will refer to the resilient material as foam, since the preferred embodiment is open-cell polyurethane foam. The foam is then folded over and bonded to itself at bond line 2. During this process, the top of the air bladder 2 may be adhesively bonded to the foam or left unbonded. It has been found that there is sufficient friction between the bladder and the foam that bonding is not generally necessary to retain the bladder in the foam, and removability is desirable in the event the bladder or foam must be replaced. The pillow is then complete, and is generally put into a fabric pillow-slip and packaged for sale.

Figure 1B shows the air bladder partially inflated with air or other gas 4. The user is now in his or her first stage of getting used to an orthopedic pillow shape, or has set the bladder at this shape permanently to get at least some benefit. Figure 1C shows the air bladder partially inflated to a higher level. The user is now in his or her second stage of getting used to an orthopedic pillow shape, or has set the bladder at this shape permanently to get some benefit. Figure 1D shows the bladder fully inflated to maximum bulbousness so that the user can get the full benefit of an orthopedically shaped pillow. In place of the bladder, any contour adjustment means could be utilized, for example, a fluid-containing bladder or other adjustment means.

In prior art pillows, inventors and designers have gone to great lengths to have the bottom surface of the pillow remain flat. It will be noted that the bottom surface of the pillows in Figures 1B, 1C, and 1D are not flat. It is not necessary to have the bottom surface be flat, since the user does not lay his

or her head on the bottom surface. I find that an advantage of having both sides of the pillow same-shaped as in Figures 1B, 1C, and 1D is that the user can flip the pillow over if it gets hot, sweaty, or saliva is drooled thereon. None of the prior art orthopedic pillows can be flipped over. While it may appear from Figures 1B, 1C, and 1D that the user's head will be at an angle when the non-inflated side of the pillow reaches the mattress, in practice the foam is very soft and bends near the bulb or neck portion to level out the head portion of the pillow.

The resilient covering of the pillow should be flexible to accommodate inflation of the air bladder so that the pillow is adjustable from flat to fully contoured. Preferably the pillow will be adjustable in desired increments, or discrete increments, to achieve a desired orthopedic effect. The resilient covering material may be polyurethane foam, memory foam, latex foam rubber, fiber batting, buckling elastomers, or a resilient material that I made of discontinuous pieces of a flexible material joined together with a low durometer high elongation elastomeric material. The resilient pillow cover will preferably be constructed so that the pillow is symmetrical with respect to at least one axis, such as top/bottom symmetry, so that the pillow may be turned over and used on both sides.

It is desirable for users that intend to set the air bladders at a preferred level and leave them at that level, to have two different heights on the two edges: One for when they lay on their side, and another for when they lay on their backs. The preferred embodiment illustrated in Figures 2A-2H addresses these issues.

Figure 2A shows the pillow 100 in the flat configuration including the bladder 30, foam folded over the bladder and bonded at 20. A second simple bladder 50 is installed near the opposite edge of the pillow from bladder 30. Bladder 50 can be the same size as bladder 30 or wider/narrower. Figures 2B, 2C, and 2D show increasing levels of inflation with air or other gas 40. This configuration provides for two levels of inflation for back and side sleeping.

Figures 2E, 2F, and 2G show that both bladders do not need to be increased or decreased together in terms of inflation. For example, Figure 2G shows that when bladder 30 is at maximum inflation, bladder 50 is at low inflation. Figure 2F shows that the foam can be in two or more adhered pieces rather than one folded and adhered piece.

Figure 2H shows another embodiment wherein the foam can be added to or replaced by a secondary padding layer 70. Examples of excellent materials 70 of my invention to add to or replace the foam are: polyester batting fiber; Reflex™ foam and other polyurethane foams by Foamex Corporation of Linwood, PA; viscoelastic (memory) foam; latex foam rubber; and Gellycomb™ buckling-column elastomer by EdiZONE, LC. Gellycomb™ and its manufacture are disclosed in U.S. patents 5,749,111 and 6,026,527 and U.S. Patent Application No. 09/303,979 filed on May 3, 1999 which are hereby incorporated by reference. The padding material 70 can replace some or all of the foam, and be on one or both sides and around either or both ends or just on the laying surfaces. Multiple alternative padding materials may be added to the pillow at 70 as desired.

Use of Gellycomb™ is highly valuable for pillows. Prior art pillows do not sufficiently conform to the fine contours of the face or head while properly supporting the broader, flatter areas of the face or head. Firmer materials such as firm polyurethane foam or buckwheat hulls are uncomfortable. Softer materials, such as soft polyurethane foam, down feathers, and imitation/substitute down feathers, are more comfortable but when lying on the side the face sinks in until the nose is blocked and breathing is hampered, or until the eye is pressed upon uncomfortably. In other words, these softer materials conform well, but do not properly support the broader, flatter areas of the face or head, which support is needed to keep the nose and eyes out of the pillow. Gellycomb™'s unique hollow buckling columns made of soft, rubbery gel conform to the fine features of the head or face by buckling where there is a point load and resisting buckling where a broad area of the face or head spans many columns. Thus it feels soft and comfortable but the face does not sink in far enough to irritate the nose and eye. Generally, Gellycomb™ is heat-bonded to a layer of non-woven fabric, and that fabric is adhesively bonded to the foam core or other core.

Figures 3A, 3B, and 3C show other preferred embodiments of my invention. Referring to Figure 3A, the pillow 300 includes a foam core 81 containing an inflatable bladder 31 is made similar to the pillows described above. Wrapped around the core 81 is a comfort layer 91. Generally, but not in every case, the comfort layer 91 is soft and allows easy cushioning penetration, while the core 8 is somewhat firmer. In this manner, the face contacts soft material for comfort but does not sink in so far as to smother the nose and eye while lying on the side. Figure 3A shows comfort layer 91,

which is made from pin-core latex foam rubber, such as Talatech™ made by Latex International West of Santa Fe Springs, CA. A good IFD (stiffness) for such foam is in the 10-13 range.

Referring to Figure 3B, another pillow 301 is shown with a foam layer 82 containing air bladder 32. Wrapped about a portion of the exterior of the pillow is a comfort layer 102. The comfort layer 102 may be made of a suitable cushioning media such as memory foam. Memory foam is available from Carpenter Foam of Freeport Center, Clearfield, Utah. A preferred memory foam is about three pounds per cubic foot, though denser foams, while more expensive, are even more preferred for comfort.

Figure 3C shows a pillow 302 including foam layer 83 about air bladder 33 and topped by comfort layer 112. In this instance, the comfort layer is a gelatinous buckling column structure of viscoelastic material, such as Gellycomb™.

In each of Figures 3A, 3B, and 3C, the comfort layer wraps around the top, shoulder area, and bottom of the pillow. Thus this preferred pillow is usable on both sides. Of course, a second bladder could be placed at the other edge of the pillow as shown in other embodiments of the invention. Or, the bladder could be eliminated while retaining the benefits of the soft and conforming comfort layer and the firmer inner core.

Referring to Figures 4A, 4B, 4C, and 4D, a pillow such as a pillow constructed according to the teachings of Figures 3A-3C, is shown at various stages of inflation, exhibiting the feature of infinite adjustability from flat to full orthopedic contour. Figure 4A depicts a firm inner core 401 of the pillow 400, such as a firm foam, a bladder 403 for inflation, and an outer softer comfort

layer 402. In Figure 4A, the bladder is not inflated. In Figures 4B, 4C and 4D, the bladder is shown at increasing stages of inflation to provide a greater pillow height and greater stiffness.

A preferred air bladder 512 for the pillows of my invention is shown in Figure 5. It is made by placing a plastic film 520 adjacent another identical film, then radio-frequency (RF) welding the desired perimeter 513 shape (generally rectangular with rounded ends is preferred). An air inlet is designed to work in harmony with an inflation device, which could be the human mouth or a hand pump or a powered pump. A means of sealing the air inlet must be provided. All of these things are well known in the air bladder art so are not disclosed in greater detail herein.

In Figure 5, the air may be pumped into the bladder by means of an integrally welded hand pump. The pump has a small hole 514 which allows air into a bladder filled with a reticulated foam 515 or other means of reinflating the pump. When the reticulated foam 515 is filled with air, the pump is squeezed with the hand while hole 514 is covered for example by the palm of the hand, which forces air through one-way valve 516 into the bladder. A bleed valve 517 is situated so as to allow air to escape in the event the user desires less air in the bladder. Such integral pump/bleed systems have been used in the past by companies such as Dielectrics Industries of Chicopee, Massachusetts for items such as shoe-tightening systems. Construction of such devices is depicted in U.S. Patent Nos. 5,372,487 and 5,144,708 which are hereby incorporated by reference. The use of such a mechanism in a pillow bladder is unique to my invention and offers the advantages of being inexpensive, out of the way, and easy to use

and control. In one preferred embodiment, the bladder will take 50-100 squeezes of the pump to go from totally flat to completely filled. This allows small incremental adjustments, which practice shows is an important feature.

One aspect of my invention is an improved foam that is useful in the outer pillow covering of the pillows of my invention as well as in other cushioning applications. I will refer to this as a gel/foam combination. There exists a need for a foam in many pillowing/cushioning applications that has a higher "hand" than prior art foams. Hand is the ability of the foam beneath a pillowed object or person to sink in deeply without dragging surrounding foam down. An aspect of my invention is to use small pieces of foam, which are very economically purchased as scrap from other manufacturing processes, and to bond these pieces of foam together with a soft, high-elongation elastomer. The soft versions of gelatinous elastomer described in U.S. Patent 5,994,450 which is hereby incorporated by reference are preferred.

A preferred elastomer stretches to twenty times its original length, and can be made very soft in durometer. For example, the use of eight to twelve parts by weight of mineral oil to one part by weight of Septon 4055 SEEPS elastomer by Kuraray yields one preferred elastomer. The elastomer may includes various additives.

The elastomer acts as an easily deformable shear layer between particles of foam, allowing them to displace easily relative to one another. This creates a very high hand, while the compressibility of the foam particles imparts bulk stiffness to the foam so that the pillowed object or person does not bottom out. The elastomer can be applied to the foam particles in either solvated or melted form. If in solvated form, the solvent must be driven off

before use. If in melted form, preferred, once cooled the foam is ready to use. The elastomer must penetrate the surface of the foam particles sufficiently to interlock with them. It is preferable to coat only the outer surface of the foam, but the elastomer can coat the interior portions of the foam as well. Advantages of this foam are myriad. The cost is very low for such a desirable foam because of the availability of scrap foams at low prices. The environment is helped by the recycling of the foam. The hand is very high, making the foam very plush and comfortable while also being supportive. Since the preferred elastomer has excellent memory, the foam does not crush down over time to the extent that it would without the elastomer. The elastomer imparts a viscoelastic property to the foam, a feature existing only in very expensive prior art foams.

It is to be understood that the above representations of my invention(s) are preferred embodiments only, and that many other embodiments are possible, including other materials, methods, and combinations. Many other applications for the pillows and cushioning materials disclosed herein are possible in addition to those mentioned.